PATENT ABSTRACTS OF JAPAN

(11)Publication number : 10-152735

(43)Date of publication of application : 09.06.1998

(51)Int.Cl. C22C 9/04
A01K 63/00
A01K 75/00

(21)Application number : 08-314444

(22)Date of filing : 26.11.1996

(71)Applicant : SANPO SHINDO KOGYO KK

(72)Inventor : OISHI KEIICHIRO
OTANI JUNICHI

(54) SEAWATER CORROSION RESISTING COPPER-BASE ALLOY, CULTIVATION NET FOR FISHES, AND CRAWL FOR CULTIVATION OF FISHES

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a crawl capable of performing superior cultivation of fishes, making the most of the characteristics of a copper-base alloy, by using a net made of copper-base alloy.

SOLUTION: A crawl 13 for cultivation of fishes is constituted by suspending a cultivation net 3 for fishes with plural floats 4 and attaching sacrificial anodes 5 composed of zinc plates to respective corner parts 3b of the cultivation net 3, respectively. The cultivation net 3 is constituted of a wire made of seawater corrosion resisting copper-base alloy having a composition consisting of, by weight, 62.0-69.0% copper, 0.2-1.0% tin, 0.02-0.15% antimony, one or two elements selected from 0.02-0.15% phosphorus, 0.1-1.0% nickel, and 0.05-0.8% iron, and the balance zinc with inevitable impurities. The mutual spacings S, S' between neighboring floats 4, 4' are regulated to ≤30cm, respectively, and the positions of respective sacrificial anodes 5 are located at a depth of 10-50cm from the surface of the sea, respectively.

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the fish preserve for fishes culture which uses the corrosion-resistance-in-sea-water copper group alloy used suitably, the culture net for fishes which consists of this corrosion-resistance-in-sea-water copper group alloy, and this culture net as a component of various products, such as apparatus treating the sea installation object immersed and contacted in the time of use, etc. in sea water, or sea water, thru/or parts.

[0002]
[Description of the Prior Art]For example, generally as a sea installation object slack culture net used in order to make fishes, such as a globefish, cultivate, the thing made from synthetic fibers, such as iron things, nylon, polypropylene, is used.
[0003]However, since marine organisms, such as shellfish, such as acorn shells, and algae, adhere easily in this iron networks and synthetic fiber net producing, There was a possibility of having adverse effects, such as stress and growth (a poor etc.) by pathopoiesis, on growth of a farmed fish by meshes of a net being plugged up by this adhesion marine organism, tide through worsening, and as a result oxygen to a culture sea water region and supply of underwater nutriment running short etc. For this reason, also from the former, air was injected at a rate of 1 or 2 times in 1, removing the marine organism adhering to a net is performed, and the net washing work by such air injection is accompanied by danger, and its work cost is also very high. And in a period just before performing net washing work, since a considerable amount of marine organisms have adhered even though meshes of a net are not the grades closed thoroughly, the adverse effect to a farmed fish cannot be eliminated so much. Air injection also becomes giving strong stress to a farmed fish and barring the healthy growth.
[0004]In iron networks, since the component slack iron is lacking in sea water-proof

corrosiveness, in a short period of time, it is comparatively easy to produce the net tear by the corrosion of a composition wire rod. Since a farmed fish will escape from there and it will become major injury if at least one net is torn, it is necessary to exchange iron networks periodically. For this reason, under the present circumstances, usually, iron networks are exchanged about 2 years. By the way, although the period (henceforth "a culture period") taken for a farmed fish to grow up to be the adult fish which has commodity value from young fish is about two years in what has early growth, it is common that it is three years or more with high-class fish, such as a globefish. Therefore, since in many cases net exchange will be performed during the culture and ****** of a farmed fish is needed at the time of net exchange, the adverse effects (stress etc.) which it has on a farmed fish by ****** are very great as well as the labor and cost burden which net clearing work takes being large. In synthetic fiber net producing, although not corroded by sea water, since it is essentially inferior to intensity, a life is shorter than iron networks and obliged to exchange in a short period of time.

[0005]Then, the thing using the wire rod made from a copper group alloy as a culture net is proposed recently. in the culture net made from this copper group alloy, adhesion of marine organisms, such as acorn shells, prevents by operation of the copper ion eluted from a wire rod -- having (this character is hereafter called "seaweed-proofing nature") -- a culture sea water region will be sterilized and sterilized. Therefore, it is not necessary to perform net washing work by air injection, and reduction of the labor accompanying this and cost and exclusion of the adverse effects (stress given to a farmed fish by air injection) which it has on a farmed fish can be aimed at. And that pathopoiesis of a farmed fish, the adverse effect by a parasite, etc. can be prevented as much as possible can aim at improvement in healthy growth of a farmed fish and a growth rate conjointly by sterilizing and sterilizing a culture sea water region.

[0006]Therefore, according to the fish preserve for culture which uses the culture net made from a copper group alloy, as compared with the case where iron networks and synthetic fiber net producing are used, the production yield can improve, the high farmed fishes of commodity value can be obtained, and development of culture industry is expected.

[0007]

[Problem(s) to be Solved by the Invention]By the way, a wire rod will be fractured by the prudence when it runs short of the mechanical strengths of a wire rod, if a culture net is that from which it is suspended at all. Since a culture net is always rocked by a wave and the wind, wire rods will contact strongly and it will be worn out (rubbing). In order that a wave may collide with a culture net repeatedly, it becomes what a wire rod becomes thin and becomes thin by the erosion operation by the shock (this phenomenon is hereafter called "****"). Since sea water has metal corrosiveness, a wire rod will be corroded by contact with sea water (this corrosion is hereafter called "sea water corrosion").Therefore, the culture net which comprised

a wire rod which run short at least one of a mechanical strength, abrasion resistance, ******-proof, and the sea water-proof corrosiveness becomes insufficient [the life].

[0008]However, although the thing of various presentations is proposed also from the former as a copper group alloy, the thing provided with all of the mechanical strength beyond the grade needed for the net for culture, abrasion resistance, ******-proof, and sea water-proof corrosiveness does not exist in a publicly known copper group alloy. For example, in the copper group alloy of a pure copper system, it is a field of the abrasion resistance, ******-proof, and sea water-proof corrosiveness in the copper group alloy of a copper-zinc system in respect of intensity, abrasion resistance, and ******-proof, and there is a problem in respect of abrasion resistance and ******-proof (and material cost) in the copper group alloy of a copper-nickel series, respectively. In the culture net incidentally manufactured using the publicly known copper group alloy when this invention person checked by experiment, the life is iron networks, an EQC, or less than it. For example, what uses naval brass (JIS C4621, CDA C46600 grade) which is the copper group alloy excellent in corrosion resistance in sea water can only secure a life equivalent to iron networks (a life is only about at most two years). Therefore, on material cost, even if the culture net made from a copper group alloy takes into consideration a predominance by the seaweed-proofing nature and sterilization / sterilization nature which were described above since it was expensive as compared with the thing of iron or the product made from a synthetic fiber, it cannot take profit at all from a life of this level. For this reason, the thing made from a copper group alloy is the point of having seaweed-proofing nature and sterilization / sterilization nature, and the actual condition is not yet put in practical use from a total cost aspect including a life, having an advantage on the culture which was extremely excellent as compared with iron things or the thing made from a synthetic fiber.

[0009]Since a copper group alloy is what has the characteristic outstanding as compared with other metal thru/or alloys (for example, it excels in above-mentioned conductivity, heat-conducting characteristic, etc. other than seaweed-proofing nature and sterilization / sterilization nature), In various products thru/or parts (for example, heat exchanger tube of the heat exchanger for marine vessels, etc.), such as apparatus treating the sea installation object immersed and contacted in the time of use, etc. in sea water besides a culture net, or sea water, It may be preferred to use it as the component, and many daily necessities which use as a component the naval brass etc. which were comparatively excellent in corrosion resistance in sea water as described above actually exist.

[0010]However, even if it is in such daily necessities, the actual condition is that development of the copper group alloy where various problems (shortage of a life etc.) by sea water corrosion etc. are pointed out and which was excellent in corrosion resistance in sea water like the culture net is desired strongly.

[0011]This invention, without spoiling the original characteristic of a copper group alloy in view

of such the actual condition, It is a thing aiming at being able to raise corrosion resistance in sea water substantially, and providing the corrosion-resistance-in-sea-water copper group alloys also including the culture net for fishes which can be conveniently used as a component of various products, such as apparatus treating the sea installation object immersed and contacted in the time of use, etc. in sea water, or sea water, thru/or parts, It aims at providing the fish preserve for fishes culture which uses the practical culture net for fishes made from a copper group alloy and this.

[0012]

[Means for Solving the Problem]If it is in this invention, a corrosion-resistance-in-sea-water copper group alloy which makes metal composition which contains 62.0 to 69.0 % of the weight of copper, 0.2 to 1.0 % of the weight of tin, and 0.02 to 0.15 % of the weight of antimony, and the remainder becomes [1st] from zinc and an inevitable impurity is proposed.

[0013]And if it is in this corrosion-resistance-in-sea-water copper group alloy, in order to aim at further improvement in the characteristic, it is preferred to carry out adequate amount content of a kind or two sorts of elements chosen from phosphorus, nickel, and iron further. Metal composition of a corrosion-resistance-in-sea-water copper group alloy Namely, 62.0 to 69.0 % of the weight of copper, Contain 0.2 to 1.0 % of the weight of tin, and 0.02 to 0.15 % of the weight of antimony, and 0.02 to 0.15 % of the weight of phosphorus, What a kind or two sorts of elements chosen from 0.1 to 1.0 % of the weight of nickel and 0.05 to 0.8 % of the weight of iron shall be contained, and the remainder shall consist of zinc and an inevitable impurity is preferred.

[0014]By the way, a main reason made into such metal composition is as stating below.

[0015]That is, copper is a basic element, and if corrosion resistance with a copper addition good at less than 62.0 % of the weight is not acquired and it exceeds 69.0 % of the weight, hot-working nature will fall. It does not improve to such an extent that corrosion resistance also balances an addition, but material cost of copper group alloy products, such as a culture net, becomes high. Since it was such, a copper addition was made into 62.0 to 69.0 % of the weight.

[0016]By adding 0.2% of the weight or more, tin is effective in raising corrosion resistance, ******-proof, abrasion resistance, and intensity. However, even if it adds exceeding 1.0 % of the weight, an effect of balancing an addition is not acquired but hot-working nature and cold work nature are made to fall on the contrary. Therefore, an addition of tin was made into 0.2 to 1.0 % of the weight.

[0017]Antimony is effective in raising corrosion resistance (especially dezincification-proof corrosiveness) by adding 0.02% of the weight or more. However, even if it adds exceeding 0.15 % of the weight, an effect of balancing it is not acquired but hot-working nature and cold work nature are made to fall on the contrary. .Therefore, an addition of antimony was made

into 0.02 to 0.15 % of the weight.

[0018]Phosphorus, nickel, and iron raise the above-mentioned characteristic of a copper group alloy further by making its kind or two sorts or more add. Although phosphorus raises corrosion resistance and abrasion resistance and ******-proof are raised by **** with nickel or iron, this effect is not fully demonstrated by less than 0.02% of the weight of addition. On the other hand, if an addition of phosphorus exceeds 0.15 % of the weight, an effect of balancing an addition not being acquired, and a problem that hot-working nature and cold work nature fall on the contrary, or stress corrosion crack sensitivity becomes high will be produced. Nickel thru/or iron raise a mechanical strength, abrasion resistance, and ******-proof by adding the one side or both. Especially nickel has the operation which also raises corrosion resistance. In order to ** and to fully demonstrate this effect by addition of nickel thru/or iron, if phosphorus is made to **** irrespective of no when both are made to ****, it is necessary to make an addition of nickel or iron into 0.1 % of the weight or more or 0.05 % of the weight or more irrespective of no, respectively. However, if an addition of nickel or iron exceeds 1.0 % of the weight or 0.8 % of the weight, respectively, an effect of balancing an addition not being acquired, and evil of cold work nature falling on the contrary will be produced. Therefore, in a case where phosphorus, nickel, and iron are made to add in addition to copper, tin, antimony, and zinc, It is appropriate to add in 0.02 to 0.15% of the weight of the range about phosphorus also including a case where nickel or iron is made to ****, and about nickel. It is appropriate to add in 0.1 to 1.0% of the weight of the range also including a case where phosphorus or iron is made to ****, and it is appropriate about iron to add in 0.05 to 0.8% of the weight of the range also including a case where phosphorus or nickel is made to add. Even if a reason for eliminating adding all of phosphorus, nickel, and iron adds these [all], it is because a prominent effect is not accepted as compared with a case where its kind or two sorts are added, and it is-less meaningless and useless.

[0019]If it is [2nd] in this invention, a culture net for fishes constituted from a wire rod which consists of the above-mentioned corrosion-resistance-in-sea-water copper group alloy is proposed in order to attain utilization of copper group alloy net producing which exhibits functions (seaweed-proofing nature, sterilization / sterilization nature, etc.) which were excellent when cultivating fishes.

[0020]By the way, generally, if it is in a fish preserve for fishes culture, although he is trying to make a culture net for fishes suspend, by two or more floats by which parallel arrangement was annularly carried out along the upper bed peripheral face, Considering years of this invention person's experience, a damage degree by **** is not uniform in a portion of a way of a culture net, and is generally remarkable in a 10-50-cm portion under the sea level. That is, in this portion, a wire-size decrement of a wire rod is unusually large as compared with other net parts. However, it is hard to think that a starting unusual wire-size reduction will be a thing only

resulting from construction material (sea water-proof corrosiveness, abrasion resistance, etc.) of a culture net if it carries out from it concentrating on a specified part near the sea level of a culture net. On the other hand, although a place in which a fish preserve for fishes culture is installed is an inland sea where a wave is general comparatively quiet, influence of a wave which a culture net receives by a typhoon etc. depending on a season may become very large. And a thing most strongly influenced in a 10-50-cm portion under the sea level of a culture net by this wave as a result of this invention person's experience and an experiment, and research, And a net part (henceforth "a float existence portion") to which a grade of the influence has met a float and a portion which is not so (it is a net part corresponding to a crevice between adjoining floats, and) It differed calling it the following "float absence portion" greatly, and it became clear in a float existence portion that influence of a wave was quite small by the breaking-the-water operation by a float. When a net part which an unusual wire-size reduction has produced was observed and analyzed in detail, under the sea level, also in a 10-50-cm portion, wire-size reduction grades differ clearly and it became clear in a float existence portion and a float absence portion that a wire-size reduction grade in a float absence portion was notably high. Therefore, if it judges synthetically from these things, the wire-size reduction with an unusual wire rod can also conclude the construction material (grades, such as sea water-proof corrosiveness and abrasiveness) to be what has very large influence according to a wave with last thing.

[0021]Then, even if this invention person was a float absence portion by repeating a further various experiment and research based on this conclusion, when a float mutual interval became below fixed, he studied stopping influencing so powerfully by a wave. Namely, if it is in the conventional fish preserve for fishes culture, although a float mutual interval is about 40-50 cm, usually, When this float mutual interval was 30 cm or less (a case where a float touches mutually is included (when a mutual interval is 0 cm)), also in a float absence portion, it studied that influence of a wave became small as much as possible, and became comparable as a float existence portion. Although a usage number of a float is determined as conditions, that necessary minimum lift is generally obtained by balancing with total weight of fish preserve members forming and a worker on condition of reservation of a scaffold where reservation and a culture worker of a proper suspension posture of a culture net can work safely that is, Thus, when a usage number of a float is determined, a float mutual interval is inevitably set to about 40-50 cm irrespective of scales (peripheral length of a culture net, etc.) of a fish preserve.

[0022]A culture net for fishes constituted from a copper group alloy excellent in corrosion resistance in sea water described [3rd] above by this invention based on this studying point to use it the culture net concerned by in addition, two or more floats by which parallel arrangement was annularly carried out along the upper bed peripheral face. In a fish preserve for fishes culture made to have suspended, what a mutual interval of an adjoining float shall be

30 cm or less that wire-size reduction of a wire rod under influence of a wave should be prevented as much as possible is proposed.

[0023]By the way, although a culture net made from a copper group alloy exhibits a function which cultivates fishes, such as seaweed-proofing nature and sterilization / sterilization nature, and was excellent, this function is based on an operation of a copper ion eluted from a composition wire rod of a culture net. On the other hand, naturally elution of a copper ion promotes **** of a wire rod, and makes the endurance of a culture net fall. Thus, elution of a copper ion is a sword of many edges, and has also become one factor for which this cannot use a culture net made from a copper group alloy.

[0024]Then, securing copper-ion elution of a grade which can collateralize seaweed-proofing nature required [4th] for culture, and sufficient, and sterilization / sterilization nature, if it is in this invention. It proposes allocating a sacrificial anode for making an oxide film form in a culture net in two or more [under the sea level in a culture net] further in the above-mentioned fish preserve for fishes culture that evil (durability degradation of a culture net by **** of a wire rod) by copper-ion elution should be eliminated as much as possible.

[0025]That is, as described above, **** (wire-size reduction of a wire rod) in a 10-50-cm portion is remarkable under the sea level, but a grade of the **** is not uniform and remarkable **** is especially accepted in a part pinpointed according to shape of a culture net, etc. For example, even the 10-50-cm portion of **** in a four-corners corner part is especially excessive in a common culture net which makes rectangular tubed one under the sea level. On the other hand, such a specified part is **** of the whole culture net part, and even if it controls copper-ion elution from this part with an oxide film, it hardly influences the copper-ion elution effect as the whole culture net.

[0026]When **** forms only in an excessive specified part an oxide film which controls elution of a copper ion paying attention to such a point, especially the above-mentioned proposal, That is, let endurance of the whole culture net be an improvement ** plug by performing local reinforcement by formation of an oxide film, securing copper-ion elution which can secure moderate seaweed-proofing nature and sterilization / sterilization nature.

[0027]It is preferred to use here things which consist of aluminum or zinc, such as tabular and rod form, as a sacrificial anode. Generally an installation place of a sacrificial anode is determined in consideration of a range (the formation range of an effective oxide film) which demonstrates a prominent effect by a sacrificial anode being the range of about 50-cm radius (average) centering on a sacrificial anode installation place. For example, it is preferred to be each corner part and to attach a sacrificial anode to a 10-50 cm (preferably 30-50 cm) position under the sea level in the above-mentioned culture net tubed [rectangular]. It cannot be overemphasized that installation of a sacrifice electrode is performed in a stage of the first stage after installing the fish preserve concerned, i.e., an early stage where a precise oxide

film stable with a sacrifice electrode is formed.

[0028]In order to aim at further improvement in the endurance of copper group alloy net producing, it is also more preferred than a part of 10 cm (usually about 70 cm) of bottom numbers [in / in addition to the above-mentioned composition / a culture net] of the sea level to constitute the upper part from a wire rod made into a major diameter from a wire diameter in other culture net portions.

[0029]

[Embodiment of the Invention]Hereafter, an embodiment of the invention is concretely described based on drawing 1 - drawing 4.

[0030]It is what shows the fish preserve 1 for fishes culture concerning this invention used in order that drawing 1 - drawing 4 may mainly cultivate high-class fish, such as a globefish, Drawing 1 and drawing 2 the fish preserve (henceforth "1st fish preserve 1_1") in a 1st embodiment, a fish preserve [in / in drawing 1 and drawing 3 / a 2nd embodiment] (henceforth "2nd fish preserve 1_2") -- drawing 1 and drawing 4 show the fish preserve (henceforth "3rd fish preserve 1_3") in a 3rd embodiment, respectively.

[0031]Each fish preserve 1_1, 1_2, and 1_3 are the culture net 3 and the float 4 of a suitable number to the buck 2, as shown in drawing 1. -- **** is attached.

[0032]The buck 2 is the frame structure which assembled the lightweight square lumber which consists of woody materials etc., the plate, the pipe material, etc. to rectangular frame shape, as shown in drawing 1. This buck 2 serves as a scaffold for a culture worker to work, and the net fitting part for attaching the upper bed part of the culture net 3 is provided in that inner periphery.

[0033]The braid of the culture net 3 is carried out using wire rod 3a-- made from a copper group alloy by the net manufacturing machine (metallic net knitting machine) used when manufacturing publicly known iron networks conventionally, as shown in drawing 1 - drawing 4, It makes the rectangular tubed one attached to the net fitting part which provided the upper bed part in the inner periphery of the buck 2 with the wire rope etc.

[0034]Each wire rod 3a which ** and constitutes the culture net 3 is the thing made from a copper group alloy fabricated by the line gestalt 3-4 mm in diameter with the conventional method. The copper group alloy (henceforth "the 2nd copper group alloy") concerning this invention indicated to the copper group alloy (henceforth "the 1st copper group alloy") or claim 2 which starts this invention indicated to claim 1 as a component of the wire rod 3a is used. That is, the 1st copper group alloy is a corrosion-resistance-in-sea-water copper group alloy which makes the metal composition which contains 62.0 to 69.0 % of the weight of copper, 0.2 to 1.0 % of the weight of tin, and 0.02 to 0.15 % of the weight of antimony, and the remainder becomes from zinc and an inevitable impurity. the 2nd copper group alloy contains 62.0 to 69.0

% of the weight of copper, 0.2 to 1.0 % of the weight of tin, and 0.02 to 0.15 % of the weight of antimony -- 0.02 to 0.15 % of the weight of both phosphorus, It is a corrosion-resistance-in-sea-water copper group alloy which makes the metal composition which contains a kind of element at least among 0.1 to 1.0 % of the weight of nickel, and 0.05 to 0.8 % of the weight of iron, and the remainder becomes from zinc and an inevitable impurity.

[0035]As shown in drawing 1 - drawing 4, float 4 -- makes the rectangular annular one along the upper bed peripheral face of the culture net 3 in the undersurface part of the buck 2, and is attached to it. a culture net -- three -- each -- the neighborhood -- being parallel -- series -- carrying out -- a float -- a group -- four -- it can set -- a mutual interval (henceforth "an in-series interval") -- S -- and -- series -- carrying out -- a float -- a group -- four -- mutual -- an interval (henceforth "a corner interval") -- S -- ' -- respectively -- being the same -- carrying out -- having -- **** .

[0036]Although the above is composition common to each fish preserve 1_1, 1_2, and 1_3, If it is in 1st fish preserve 1_1, it carries out on condition of stable reservation of the scaffold of float 4 -- whose reservation and culture worker of the proper suspension posture of the culture net 3 can work a usage number safely similarly in the former, That is, it is determined as conditions that that necessary minimum lift is obtained will balance with the total weight of fish preserve members forming (the buck 2, the culture net 3, float 4 --, etc.) and a worker. If it is in 1st fish preserve 1_1 as a result of **(ing), doing in this way and determining float 4 --, as shown in drawing 2, generally, the in-series interval S is set to 40-50 cm, and it is [whether corner interval S' is the same in the in-series interval S and abbreviation, and] a little large.

[0037]It is the float 4 so that the in-series interval S and corner interval S' may be set to 30 cm or less as shown in drawing 3 or drawing 4 if it is in 2nd fish preserve 1_2 or 3rd fish preserve 1_3. -- It is made [many / suitably] rather than determined by carrying out, as the usage number was described above.

[0038]The float 4 used in each fish preserve 1_1, 1_2, and 1_3 is the same as that of what is conventionally used in the publicly known fish preserve for fishes culture, and makes the shape of a barrel shape thru/or cylindrical shape of about 1 m and the product made from ********** for length.

[0039]If it is in 3rd fish preserve 1_3, as shown in drawing 4, it is a suitable height part in the range of 10-50 cm (preferably 30-50 cm) under the sea level in the culture net 3, Sacrificial anode 5 -- which turns into especially remarkable part, i.e., four-corners corner part, 3b-- of **** from aluminum or zinc is attached, and it has devised so that a precise oxide film may be formed in the range of about 50-cm radius centering on this part. That is, by reinforcing beforehand especially remarkable corner part 3b-- of **** with the oxide film, the **** advance

by elution of a copper ion is prevented as much as possible, and further durability enhancement of the culture net 3 whole is planned.

[0040]If it is in each fish preserve 1_1 constituted as mentioned above, 1_2, and 1_3, Since the culture net 3 consists of wire rod 3a-- made from a copper group alloy, adhesion of marine organisms, such as acorn shells, will be prevented, and a culture sea water region will be sterilized and sterilized by operation of the copper ion eluted from wire rod a--. Therefore, it is not necessary to perform net washing work by air injection, and reduction of the labor accompanying this and cost and exclusion of the adverse effects (stress given to a farmed fish by air injection) which it has on a farmed fish can be aimed at. And that pathopoiesis of a farmed fish, the adverse effect by a parasite, etc. can be prevented as much as possible can aim at improvement in healthy growth of a farmed fish and a growth rate conjointly by sterilizing and sterilizing a culture sea water region.

[0041]If it is in each fish preserve 1_1, 1_2, and 1_3, Since the 1st copper group alloy or the 2nd copper group alloy which is a component of the culture net 3 is extremely excellent in corrosion resistance in sea water as compared with a publicly known copper group alloy conventionally so that I may be understood from Example 1, even if the life of the culture net 3 compares with iron networks, it improves substantially. Therefore, it becomes what balances profit enough to replace with iron networks and to use the culture net 3 made from a copper group alloy, and utilization is not barred from a cost aspect. and, also when cultivating high-class fish (for example, a globefish -- the goods from young fish -- the culture period taken to grow up to be valuable adult fish is about three years), such as a globefish with a long culture period, It is not necessary to perform clearing work of the culture net 3 made not desirable from the adverse effect which it has on a farmed fish during the culture in addition to a labor and cost.

[0042]If it is in 2nd fish preserve 1_2 or 3rd fish preserve 1_3, Since the adjoining interval S of the floats 4 and 4, i.e., an in-series interval, and corner interval S' were 30 cm or less, Float existence portion 3c of the culture net 3 -- (it is a float back side portion which counters the float 4, and) The influence of a wave like the hardly received net part by the breaking-the-water operation by the float 4, It is not influenced so much by a wave about 3d of float absence partial [of the culture net 3] -- (it is the float existence portion 3c and a net part located among 3c among the net parts located in the float 4 and a same height position, and the considerable portion in the corner part 3b is included). (Therefore, **** 3a, i.e., the wire rod, under influence of a wave -- Wire-size reduction will be controlled as much as possible, and the life of the culture net 3 improves further as compared with 1st fish preserve 1_1.)

[0043]If it is in 3rd fish preserve 1_3, since the precise oxide film by sacrificial anode 5 -- is formed in the net part which **** tends to produce under influence on a wave, elution of the copper ion in the net part concerned is controlled, and **** by elution of a copper ion is

prevented as much as possible. As a result, of course, if the life of the culture net 3 compares with 1st fish preserve 1_1, even if it compares with 2nd fish preserve 1_2, it improves. On the other hand, since sacrificial anode 5 -- only forms an oxide film in **** of the culture net 3 part, even if it compares it with 1st and 2nd fish preserve 1_1 which does not provide sacrificial anode 5 --, and 1_2, The seaweed-proofing nature by elution of a copper ion and sterilization / sterilization nature cannot fall so much, and improvement in healthy growth of a farmed fish and a growth rate can be aimed at.

[0044]According to the 1st - 3rd fish preserve 1_1, 1_2, and 1_3, as compared with the case where iron networks are used, total cost can be reduced, the production yield can be raised substantially, and the high farmed fishes of commodity value can be obtained from the above thing.

[0045]

[Example]Under charcoal covering, the air dissolution of copper group alloy No.1 concerning this invention which makes the presentation shown in Table 1 as Example 1 - No.9 was respectively carried out with the high frequency fusion furnace, and the ingot which makes cylindrical shape 100 mm in diameter and 200 mm in length was cast. And the surface of each ingot was cut and the processing ingot which makes cylindrical shape 95 mm in diameter and 150 mm in length was obtained. Each processing ingot was heated at 800 **, and also direct extrusion was carried out with the extruding press (200 t), and a cylindrical raw material 10 mm in diameter was obtained. After carrying out pickling treatment of each cylindrical raw material after an appropriate time, extraction between the colds and annealing (500 **, 1 hour) were repeated twice, and a wire rod 3.2 mm in diameter (10% of extractability between the colds) was obtained. Copper group alloy No.1 is equivalent to the 1st copper group alloy here, and copper group alloy No.2 - No.9 are equivalent to the 2nd copper group alloy.

[0046]The wire rod which consists of copper group alloy No.10-No.12 which makes the presentation shown in Table 1 as a comparative example was obtained by the same conditions and a process also in the above-mentioned Example 1. Each of No.10 - No.12 is publicly known copper group alloys here, Copper group alloy No.10 is equivalent to common brass of "JIS C2700", copper group alloy No.11 is equivalent to naval brass of "JIS C4621", and copper group alloy No.12 is equivalent to naval brass of "CDA C46600."

[0047]And sea water was made to immerse what cut each wire rod in length of 500 mm in a actual inland sea, and it was neglected as it was.

[0048]Next, forms of corrosion were judged about each wire rod pulled up after two-year progress and out of sea water. The result was as being shown in Table 1. In Table 1, although the wire surface was changing to rugged form, x showed what O showed what dezincification corrosion was not accepted to at all, and clear dezincification was accepted to.

[0049]100 places were cut about each wire rod pulled up out of sea water, the corrosion depth (corrosion depth from a wire surface) in those cutting planes was measured, and the maximum corrosion depth (mm) and the average corrosion depth (mm) were measured. The result was as being shown in Table 1.

[0050]

[Table 1]

銅基合金No.		金属組成（重量%）							最大腐蝕深さ	平均腐蝕深さ	脱亜鉛腐蝕
		Cu	Sn	Sb	Ni	P	Fe	Zn			
実施例I	1	65.2	0.5	0.07	−	−	−	残部	0.08	0.02	○
	2	66.8	0.6	0.04	0.6	−	−	残部	0.05	0.01	○
	3	66.6	0.6	0.04	0.6	−	−	残部	0.05	0.01	○
	4	64.2	0.4	0.08	0.3	0.03	−	残部	0.04	0.01	○
	5	64.5	0.4	0.07	0.3	0.03	−	残部	0.04	0.01	○
	6	62.9	0.5	0.12	0.9	−	0.6	残部	0.03	0.01	○
	7	68.1	0.9	0.02	−	0.06	−	残部	0.05	0.01	○
	8	64.5	0.3	0.05	−	−	0.09	残部	0.04	0.01	○
	9	65.6	0.5	0.06	−	0.03	0.3	残部	0.04	0.01	○
比較例	10	65.6	−	−	−	−	−	残部	0.69	0.45	×
	11	63.2	0.8	−	−	−	0.08	残部	0.44	0.15	×
	12	61.5	0.7	0.07	−	−	−	残部	0.39	0.17	×

[0051]Copper group alloy No.1 concerning this invention - No.9 so that he can understand from Table 1, Dezincification does not arise but all show Haruka the small value especially about the maximum corrosion depth and the average corrosion depth rather than the minimum which naval brass No.11 which should be excellent in corrosion resistance in sea water among publicly known copper group alloy No.10 - No.12, and No.12 show.
It is clear to excel in corrosion resistance in sea water extremely.

[0052]by the way, in a culture net, since the problem of a net fracturing with prudence of a net will be produced if it is alike in it being a product made from a copper group alloy as it is iron, and it will not be involved but the stress area of the wire rod which is a component will generally be less than (it is less than about 55% about a wire size) 30% by corrosion, it is necessary to exchange nets

[0053]However, about publicly known copper group alloy No.10-No.12, the corrosion depth on the diameter line of a wire rod is set to 0.7-1.3 mm (twice of the maximum corrosion depth shown in Table 1) at the maximum, and 20 to 40% of the wire size before sea water immersion

is being corroded. Therefore, it is considerable to judge that a life will not be filled with the culture net which consists of these copper group alloy No.10-No.12 in 2 if it also takes into consideration that corrosion is promoted when net parts rub by a wave.

[0054]On the other hand, in copper group alloy No.1-No.9 concerning this invention. The corrosion depth on the diameter line of a wire rod is only 0.06-0.16 mm at the maximum (especially). From small at copper group alloy No.2-No.9 which is the 2nd copper group alloy or it being 0.06-0.1 mm, with the culture net which consists of these copper group alloys. Even if it takes into consideration that corrosion is promoted when net parts rub by a wave, what the life will far exceed two years for is understood easily. This will become clearer according to Examples 2-8 mentioned later.

[0055]Next, as shown in Table 2, manufacture 1st fish preserve 1_1 shown in drawing 1 and drawing 2 which use the culture net 3 which consists of copper group alloy No.1 shown in the 1st example, No.3, and No.5, respectively as Examples 2-4, and as Examples 5 and 6, 3rd fish preserve 1_3 shown in drawing 1 and drawing 4 which use the culture net 3 which manufactures 2nd fish preserve 1_2 shown in drawing 1 and drawing 3 which use the culture net 3 which consists of above-mentioned copper group alloy No.3 and No.5, respectively, and consists of above-mentioned copper group alloy No.3 and No.5 as Examples 7 and 8 was manufactured.

[0056]

[Table 2]

	生簀	銅基合金	浮子相互間隔		犠牲陽極
実施例2	第1生簀1_1	No. 1	S＝40cm	S´＝90cm	なし
実施例3	第1生簀1_1	No. 3	S＝40cm	S´＝90cm	なし
実施例4	第1生簀1_1	No. 5	S＝40cm	S´＝90cm	なし
実施例5	第2生簀1_2	No. 3	S＝10cm	S´＝10cm	なし
実施例6	第2生簀1_2	No. 5	S＝10cm	S´＝10cm	なし
実施例7	第3生簀1_3	No. 3	S＝10cm	S´＝10cm	あり
実施例8	第3生簀1_3	No. 5	S＝10cm	S´＝10cm	あり

[0057]That is, in Example 2, first, under charcoal covering, the air dissolution (dissolved amount: 5000 kg) of copper group alloy No.1 was carried out with the low frequency wave fusion furnace (400 kW), and a cylindrical ingot 240 mm in diameter was cast. And direct extrusion of this ingot was carried out with the extruding press (3000t), and a cylindrical raw material 10 mm in diameter was obtained. After an appropriate time, extraction between the colds and annealing were repeated for this cylindrical raw material, and the wire rod 3a of 3.2 mm (10% of extractability between the last colds) of wire sizes was obtained.

[0058]Next, the square tubed culture net 3 which knit in the net gestalt for fishing nets using the wire rod 3a obtained in this way, and set one-side length to 9 m, and was 5 m in depth (sliding direction width) was obtained.

[0059]And 1st fish preserve 1_1 which attaches this culture net 3 and 24 floats (6 per row) 4 -- to the buck 2 of square frame shape was manufactured. It is the float 4 if it is in this fish preserve 1_1. -- Mutual intervals were S= 40 cm of in-series intervals, and corner interval S'=90cm. As the float 4, the publicly known thing (barrel shape float made from styrene foam 1 m in length) currently generally used conventionally was used.

[0060]In Example 3, 1st fish preserve 1_1 [being the same as that of Example 2 (the size of the wire rod 3a and the culture net 3, shape, and a manufacturing process are included)] was manufactured except for the point which set the component of the wire rod 3a to copper group alloy No.3. The wire size of the wire rod 3a and the culture net 3, shape, and a manufacturing process are the same also in Example 2.

[0061]In Example 4, 1st fish preserve 1_1 [being the same as that of Example 2 (the size of the wire rod 3a and the culture net 3, shape, and a manufacturing process are included)] was manufactured except for the point which set the component of the wire rod 3a to copper group alloy No.5.

[0062]The culture net 3 of the above which comprised the same wire rod 3a (copper group alloy No.3) as the wire rod used in Example 3 in Example 5, and identical shape (one-side 9 m in length, 5 m-deep square tubed) is used, And by using a total of 32 floats 4 -- by eight per row, 2nd fish preserve 1_2 which shows both the in-series interval S and corner interval S' to drawing 1 and drawing 3 which were 10 cm was manufactured. That is, 2nd fish preserve 1_2 manufactured in this Example 5 is the same as that of Example 3 except for the point increases every two float 4 -- per each sequence, and it was made to be set to S=S'=10cm (the size of the wire rod 3a and the culture net 3, shape, and a manufacturing process are included).

[0063]In Example 6, 2nd fish preserve 1_2 [being the same as that of Example 5 (the size of the wire rod 3a and the culture net 3, shape, and a manufacturing process are included)] was manufactured except for the point which set the component of the wire rod 3a to copper group alloy No.5.

[0064]In Example 7, being the same as that of Example 5 (the size of the wire rod 3a and the culture net 3, shape, and a manufacturing process are included) and 3rd fish preserve 1_3 shown in drawing 1 and drawing 4 which were carried out were manufactured except for the point of having attached sacrificial anode 5 -- to a 50-cm part under the sea level in each corner part 3b of the culture net 3. A 10-kg zinc plate was used as each sacrificial anode 5.

[0065]In Example 8, 3rd fish preserve 1_3 [being the same as that of Example 7 (the size of the wire rod 3a and the culture net 3, shape, and a manufacturing process are included)] was manufactured except for the point which set the component of the wire rod 3a to copper group alloy No.5.

[0066]And each fish preserve 1_1 [more than], 1_2, and 1_3 were actually used in the nursery of a globefish, and the wire-size decrement (mm) of the wire rod 3a in 15 specific places was measured about the culture net 3 after progress for one year after the beginning of using, and two years. Namely, the part (survey point) which specified the wire-size decrement, Five places located from the sea level at the distance of H_1, H_2, H_3, H_4, and H_5 (cm) on the X-X line which passes the corner part 3b of the culture net 3 as shown in drawing 1, Five places located from the sea level at the distance of H_1, H_2, H_3, H_4, and H_5 (cm) on the Y-Y line which passes the float existence portion 3c of the culture net 3, And they are five places located from the sea level at the distance of H_1, H_2, H_3, H_4, and H_5 (cm) on the Z-Z line which passes 3 d of float absence portions (except the portion equivalent to the corner part 3b) of the culture net 3. They are H_1=10cm, H_2=30cm, H_3=50cm, H_4=1m, and H_5=2m here.

[0067]The result was as being shown in Tables 3-9. A wire-size decrement measures the wire size after the one-year progress in each side point, and two-year progress, and deducts the measured value from the original wire-size value (3.2 mm).

[0068]

[Table 3]

	実施例 2					
	1年後の線径減少量（mm）			2年後の線径減少量（mm）		
測点	X	Y	Z	X	Y	Z
H_1	0.39	0.23	0.33	0.76	0.40	0.63
H_2	0.30	0.17	0.22	0.60	0.32	0.41
H_3	0.18	0.11	0.13	0.37	0.17	0.25
H_4	0.06	0.05	0.06	0.12	0.11	0.10
H_5	0.07	0.04	0.05	0.11	0.10	0.10

[0069]

[Table 4]

	実施例 3					
	1年後の線径減少量（mm）			2年後の線径減少量（mm）		
測点	X	Y	Z	X	Y	Z
H_1	0.40	0.18	0.33	0.75	0.34	0.62
H_2	0.29	0.12	0.21	0.59	0.25	0.43
H_3	0.17	0.06	0.13	0.33	0.09	0.23
H_4	0.05	0.05	0.04	0.07	0.12	0.08
H_5	0.05	0.03	0.04	0.09	0.10	0.08

[0070]

[Table 5]

	実施例 4					
	1年後の線径減少量（mm）			2年後の線径減少量（mm）		
測点	X	Y	Z	X	Y	Z
H_1	0.37	0.20	0.30	0.73	0.29	0.61
H_2	0.28	0.14	0.19	0.57	0.26	0.44
H_3	0.15	0.09	0.11	0.29	0.12	0.19
H_4	0.05	0.03	0.04	0.07	0.09	0.09
H_5	0.06	0.03	0.04	0.08	0.10	0.06

[0071]

[Table 6]

	実施例 5					
	1年後の線径減少量（mm）			2年後の線径減少量（mm）		
測点	X	Y	Z	X	Y	Z
H_1	0.28	0.16	0.20	0.49	0.31	0.36
H_2	0.20	0.13	0.11	0.43	0.27	0.30
H_3	0.10	0.07	0.08	0.19	0.10	0.14
H_4	0.04	0.03	0.04	0.11	0.10	0.08
H_5	0.03	0.04	0.03	0.06	0.12	0.07

[0072]

[Table 7]

	実施例 6					
	1年後の線径減少量（mm）			2年後の線径減少量（mm）		
測点	X	Y	Z	X	Y	Z
H_1	0.24	0.17	0.18	0.50	0.33	0.36
H_2	0.18	0.12	0.11	0.39	0.22	0.27
H_3	0.10	0.07	0.09	0.23	0.09	0.10
H_4	0.05	0.03	0.03	0.08	0.07	0.10
H_5	0.02	0.04	0.04	0.08	0.07	0.08

[0073]

[Table 8]

	実施例 7					
	1年後の線径減少量（mm）			2年後の線径減少量（mm）		
測点	X	Y	Z	X	Y	Z
H_1	0.15	0.18	0.19	0.35	0.38	0.39
H_2	0.11	0.13	0.12	0.29	0.24	0.27
H_3	0.08	0.08	0.07	0.14	0.12	0.09
H_4	0.04	0.05	0.05	0.08	0.10	0.11
H_5	0.02	0.05	0.04	0.12	0.09	0.10

[0074]

[Table 9]

	実施例 8					
	1年後の線径減少量（mm）			2年後の線径減少量（mm）		
測点	X	Y	Z	X	Y	Z
H_1	0.14	0.15	0.16	0.37	0.29	0.38
H_2	0.13	0.13	0.12	0.35	0.28	0.31
H_3	0.05	0.05	0.06	0.18	0.11	0.10
H_4	0.03	0.04	0.06	0.11	0.08	0.09
H_5	0.05	0.03	0.02	0.10	0.09	0.07

[0075]**, as the beginning described, in a 10-50-cm net part, it is understood under the sea level that erosion is excessive, so that clearly from Tables 3-5, but. In Examples 2-4 which have not given the exceptional device except for the component of the wire rod 3a, it is understood that the culture net 3 can be used at least about back 1 year, in view of the wire-

size decrement per year.

[0076]Namely, if the culture net 3 is carried out from the ability to be used convenient until the wire size of the composition wire rod 3a decreases to about 55% (it is got blocked and a wire size decreases from 3.2 mm to about 1.8 mm) as mentioned above, The tolerance limit of a wire-size decrement when using the culture net 3 can be considered to be about 1.4 mm. Then, considering the wire-size decrement per [which is obtained from the wire-size decrement at the time of the one year progress shown in Tables 3-5, and two year progress, and these also in any of Examples 2-4] year, The thing which can use the culture net 3 and for which it is got blocked and about at least three years of life can be secured is understood at least about back 1 year.

[0077]It was checked by using the 1st copper group alloy or the 2nd copper group alloy concerning this invention as a component of the culture net 3 from this that even the grade that the life of the culture net made from a copper group alloy is usable may be raised. About corrosion resistance in sea water including ******-proof, it was similarly checked also in Example 1 that the 2nd copper group alloy is further superior to the 1st copper group alloy.

[0078]After using the 2nd copper group alloy concerning this invention as a component of the culture net 3 so that clearly from Tables 6 and 7, In Examples 5 and 6 which devised also in the composition of the fish preserve and set the float mutual interval S and S' to 10 cm, it is understood that the wire-size decrement about the net part which is 10-50 cm under the sea level where erosion is excessive has decreased extremely as compared with Examples 2-4. Namely, in three place H_1 on the Y-Y line which receives the breaking-the-water operation by the float 3 among 10-50-cm net parts under the sea level, H_2, and H_3, In three place H_1 on the X-X line which does not receive directly the breaking-the-water operation by the float 3 although Examples 2-4 and a remarkable difference are not accepted, and a Z-Z line, H_2, and H_3, It is small substantially, and it is decreasing even to such an extent that there is almost no difference also in three place H_1 on a Y-Y line, H_2, and H_3, rather than a wire-size decrement can set in the Examples 2-4.

[0079]What (it far exceeds three years) the **** advance under the influence of a wave can be prevented effectively, **** of the whole net can be controlled as much as possible, it has, and the life of the culture net 3 improves substantially by making the float mutual interval S and S' small from this was checked.

[0080]clear from Tables 8 and 9 -- as -- the component (the 2nd copper group alloy) and float mutual interval (S=S'=10cm) of the culture net 3 -- in addition, In Examples 7 and 8 which attached sacrificial anode 5 --, it is still smaller rather than the wire-size decrement about the net part which is 10-50 cm under the sea level where erosion is excessive can set in the Examples 5 and 6. This is because **** also including the influence of a wave was controlled

effectively, when a precise oxide film is formed in the adjacent spaces of the installed part of sacrificial anode 5 --.

[0081]Therefore, when making it **** make an oxide film form in an excessive net part by sacrificial anode 5 --, it was checked that the life of the culture net 3 can be raised further.

[0082]In the fish preserve of each example, although the state of the culture net 3 was observed at the time of one-year progress and two-year progress, most of adhesion of marine organisms, such as acorn shells, was not admitted. It was checked that each globefish cultivated in these fish preserves is carrying out proper and favorable growth. The culture net made from a copper group alloy applied to this invention from this also including the culture net 3 of Examples 7 and 8 with which the oxide film was formed in some nets has the effective seaweed-proofing nature by elution of a copper ion, and sterilization / sterilization nature. As compared with iron networks thru/or synthetic fiber net producing, it is understood that it is what can perform very effective fishes culture.

[0083]

[Effect of the Invention]According to the invention indicated to claims 1 and 2, the copper group alloy which was extremely excellent in corrosion resistance in sea water as compared with the publicly known copper group alloy conventionally can be provided so that clearly also from the above explanation. Therefore, a copper group alloy use can be expanded even to the field which was not able to be used from the field of total cost including the endurance to sea water, and the characteristic of a copper group alloy of excelling as compared with other metal can be used effectively.

[0084]According to the invention indicated to claims 3, 4, and 5, it can be made to be able to improve even to such an extent that the life of a culture net is usable also in total cost, and very good fishes culture in which the characteristic of copper group alloy net producing was employed efficiently can be performed.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]A corrosion-resistance-in-sea-water copper group alloy making metal composition which contains 62.0 to 69.0 % of the weight of copper, 0.2 to 1.0 % of the weight of tin, and 0.02 to 0.15 % of the weight of antimony, and the remainder becomes from zinc and an inevitable impurity.
[Claim 2]Contain 62.0 to 69.0 % of the weight of copper, 0.2 to 1.0 % of the weight of tin, and 0.02 to 0.15 % of the weight of antimony, and 0.02 to 0.15 % of the weight of phosphorus, A corrosion-resistance-in-sea-water copper group alloy making metal composition which contains a kind or two sorts of elements chosen from 0.1 to 1.0 % of the weight of nickel, and 0.05 to 0.8 % of the weight of iron, and the remainder becomes from zinc and an inevitable impurity.
[Claim 3]A culture net for fishes constituting from a wire rod which consists of a corrosion-resistance-in-sea-water copper group alloy indicated to claim 1 or claim 2.
[Claim 4]A fish preserve for fishes culture which is a fish preserve for fishes culture made to have suspended, and is characterized by a mutual interval of an adjoining float having been 30 cm or less by two or more floats by which parallel arrangement was annularly carried out along the upper bed peripheral face in a culture net for fishes indicated to claim 3.
[Claim 5]A fish preserve for fishes culture having allocated a sacrificial anode for making an oxide film form in a culture net in two or more [under the sea level in a culture net] and which is indicated to claim 4.

[Translation done.]